

1 1. A coated nanocrystal capable of light emission, comprising:
2 a core selected from the group consisting of CdX, where x = S, Se, Te, and
3 mixtures thereof, said core being a member of a substantially monodisperse particle
4 population; and
5 an overcoating of ZnY, where Y = S, Se, uniformly deposited thereon, said coated
6 core characterized in that when irradiated the particles emit light in a narrow spectral
7 range of no greater than about 60 nm at full width half max (FWHM).

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9 2. A coated nanocrystal capable of light emission, comprising:
10 a core selected from the group consisting of CdX, where x = S, Se, Te, and
11 mixtures thereof, said core being a member of a substantially monodisperse particle
12 population; and
13 an overcoating of ZnY, where Y = S, Se, uniformly deposited thereon, said coated
14 core characterized in that the nanocrystal exhibits less than a 10% rms deviation in
15 diameter of the core.

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17 3. The coated nanocrystal of claim 1, wherein the spectral range is not
18 greater than about 40 nm at full width half max (FWHM).

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20 4. The coated nanocrystal of claim 1, wherein the spectral range is not
21 greater than about 30 nm at full width half max (FWHM).

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23 5. The coated nanocrystal of claim 1, wherein the coated nanocrystal exhibits
24 photoluminescence having quantum yields of greater than 30%.

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26 6. The coated nanocrystal of claim 1, wherein the coated nanocrystal exhibits
27 photoluminescence having quantum yields in the range of about 30 to 50%.

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1 7. The coated nanocrystal of claim 2, wherein the coated nanocrystal
2 exhibits less than a 5% rms deviation in size of the core.

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4 8. The coated nanocrystal of claim 1 or 2, wherein the overcoating comprises
5 one to two monolayers of ZnY.

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7 9. The coated nanocrystal of claim 1, wherein the narrow spectral range is
8 selected from the spectrum in the range of about 470 nm to about 620 nm.

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10 10. The coated nanocrystal of claim 2, wherein the particle size of the core is
11 selected from the range of about 20 Å to about 125 Å.

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13 11. The coated nanocrystal of claim 1 or 2, wherein the nanocrystal further
14 comprises an organic layer on the nanocrystal outer surface.

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16 12. The coated nanocrystal of claim 11, wherein the organic layer is
17 comprised of moieties selected to provide compatibility with a suspension medium.

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19 13. The coated nanocrystal of claim 11, wherein the organic layer is
20 comprised of moieties selected to exhibit affinity for the outer surface of the
21 nanocrystal.

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23 14. The coated nanocrystal of claim 13, wherein the organic layer comprises
24 a short-chain polymer terminating in a moiety having affinity for a suspending
25 medium.

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27 15. A method of preparing a coated nanocrystal capable of light emission,
28 comprising:

1 introducing a substantially monodisperse first semiconductor core population and
2 a precursor capable of thermal conversion into a second semiconductor material into a
3 coordinating solvent,

4 wherein the coordinating solvent is maintained at a temperature sufficient to
5 convert the precursor into the second semiconductor material yet insufficient to
6 substantially alter the monodispersity of the first semiconducting core,

7 wherein the second semiconductor material has a band gap greater than the first
8 semiconducting nanocrystal, and

9 whereby an overcoating of the second semiconductor material is formed on the
10 first semiconducting nanocrystal.

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12 16. The method of claim 15, further comprising:

13 monitoring the monodispersity of the nanocrystal during conversion of the
14 precursor and overcoating of the first semiconductor nanocrystal.

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16 17. The method of claim 15, wherein the is was lowered in response to a
17 spreading of the size distribution as estimated from the absorption spectra.

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19 18. The method of claim 15, wherein the temperature is increased in response
20 to when monitoring indicates growth appears to stop.

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22 19. The method of claim 15, wherein the first semiconductor crystal is
23 selected from the group consisting of CdX, where X = S, Se and Te.

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25 20. The method of claim 15, wherein the second semiconductor material is
26 selected from the group consisting of ZnS, ZnSe, CdS and CdSe and mixtures thereof.

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28 21. The method of claim 15, wherein the particle size of the core is in the
29 range of about 20Å to about 125 Å.

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1 22. The method of claim 15, wherein the nanocrystal further comprises an
2 organic layer on the nanocrystal outer surface.

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4 23. The method of claim 22, wherein the organic layer is obtained by
5 exposing the nanocrystal to an organic compound having affinity for the nanocrystal
6 surface, whereby the organic compound displaces the coordinating solvent.

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